e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(4); 1203-1209

Original Research Article

Open Technique Versus Blind Technique in Placement of Primary Ports in Laparoscopic Procedures

Ajay Kothari[1], Divya Kothari[2]

[1]Assistant Professor, Department of General Surgery, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India

[2]Assistant Professor, Department of Obstetrics & Gynaecology, Vyas Medical College and Hospital, Jodhpur, Rajasthan, India

Received: 15-01-2024 / Revised: 13-02-2024 / Accepted: 25-03-2024

Corresponding Author: Dr. Ajay Kothari

Conflict of interest: Nil

Abstract:

Background: Laparoscopic surgery has revolutionized surgical practice, offering minimally invasive alternatives to traditional open procedures. The technique for primary port placement plays a crucial role in the success of laparoscopic procedures. The choice between open and blind techniques for port placement remains a subject of debate, with limited evidence guiding clinical practice. This study aimed to compare the outcomes of open technique versus blind technique in primary port placement for various laparoscopic procedures.

Methods: A prospective cohort study was conducted at tertiary care hospital involving patients scheduled for elective laparoscopic procedures between July 2021 to June 2023. Patients were allocated to either the open technique group or the blind technique group based on surgeon preference. Inclusion criteria included age ≥ 18 years and provision of informed consent. Patients with contraindications to laparoscopic surgery or those requiring emergent procedures were excluded. Demographic data, operative times, intraoperative complications, postoperative pain scores, length of hospital stay, and postoperative complications were recorded and analyzed.

Results: A total of 52 patients were included in the study, with 26 patients in each group. In our study, the mean operative time was significantly shorter in the open technique group (70.3 ± 10.2 minutes) compared to the blind technique group (85.1 ± 12.5 minutes), with a p-value of less than 0.0001.Moreover, the open technique group exhibited lower rates of intraoperative complications, including vascular and organ injuries, compared to the blind technique group. Although there were no significant differences in overall rates of postoperative complications between the two groups, subgroup analysis revealed variations in the types of complications encountered. Wound infections and wound dehiscence were more prevalent in the blind technique group, while vascular and organ injuries were less common in the open technique group.

Conclusion: The findings of this study suggest that the choice of primary port placement technique may influence operative outcomes and complication rates in laparoscopic surgery. The open technique appears to offer advantages over the blind technique, including shorter operative times and potentially reduced intraoperative complications.

Keywords: Laparoscopic Surgery, Primary Port Placement, Open Technique, Blind Technique, Operative Time, Intraoperative Complications, Postoperative Complications.

Introduction

Laparoscopic surgery, a cornerstone of modern surgical practice, has substantially transformed many procedures by offering patients reduced postoperative pain, shorter hospital stays, and faster recovery times compared to traditional open surgeries [1]. Central to the success of laparoscopic procedures is the accurate placement of primary ports, through which surgical instruments and cameras are inserted into the abdominal cavity [1]. The primary ports serve as access points for visualization, manipulation, and removal of tissues or organs during the operation [2].

The two main techniques for primary port placement are the open technique and the blind technique. In the open technique, the surgeon makes a small incision in the abdominal wall and directly visualizes the entry of the primary port into the peritoneal cavity [3]. This method provides direct visualization of tissue layers, blood vessels, and potential adhesions, allowing for precise placement and minimizing the risk of complications such as injury to blood vessels or organs [4]. Conversely, the blind technique involves inserting the primary port without direct

visualization of the entry site [5]. Instead, the surgeon relies on anatomical landmarks, external palpation, and estimation of entry angles to guide port placement. While the blind technique is quicker and requires less dissection compared to the open technique, it carries a higher risk of complications such as inadvertent injury to organs or vessels, as well as suboptimal port positioning leading to difficulty in instrument manipulation and reduced surgical efficiency [6].

Statistics indicate that laparoscopic surgery has become increasingly prevalent across various surgical specialties, with a significant portion of procedures now performed using minimally invasive techniques [7,8]. For instance, in the United States alone, laparoscopic cholecystectomy has become the standard approach for the treatment of symptomatic gallstone disease, comprising approximately 90% of all cholecystectomies performed annually [9]. Similarly, laparoscopic procedures are widely adopted in gynecological surgeries, including hysterectomy and ovarian cystectomy, as well as in urological surgeries such as nephrectomy and prostatectomy [10].

Several studies have investigated the comparative outcomes of these two techniques in terms of operative time, complication rates, and patient outcomes [8,9,10,11]. However, there remains a lack of consensus regarding the superiority of one technique over the other [10]. Factors such as surgeon experience, patient anatomy, and the specific procedure being performed may influence the choice of port placement technique and its associated outcomes [11].

Given the importance of primary port placement in laparoscopic surgery and the ongoing debate regarding the optimal technique, further research is warranted to provide evidence-based recommendations for surgeons.

This study aimed to compare the outcomes of primary port placement using the open technique versus the blind technique in laparoscopic procedures, with a focus on operative efficiency, complication rates, and patient safety.

Materials and Methods

Study Design: This prospective comparative studywas conducted under the department of the General Surgery of a tertiary care centre for a period of 2 years during July 2021 to June 2023, after obtaining the ethical approvalfrom the Institutional Ethical Committee (IEC).

Study Participants: Patients scheduled to undergo elective laparoscopic procedures atwere considered for inclusion in the study. Inclusion criteria included age ≥ 18 years and provision of informed consent. Patients with contraindications to laparoscopic surgery, such as severe cardiopulmonary disease, coagulopathy, or extensive intra-abdominal adhesions, were excluded from participation. Additionally, patients requiring emergent procedures or those deemed medically unfit for elective surgery were excluded.

Sample Size Calculation: The sample size was calculated based on a priori power analysis, considering a clinically significant difference in operative time between the two groups. Assuming a standard deviation of operative time from previous study as 15 minutes, a power of 80%, and an alpha error of 0.05, a sample size of 26 patients per group was determined to detect a significant difference in operative time.

Randomization: Eligible patients were randomized into two groups: the open technique group and the blind technique group. Randomization was performed using computer-generated random numbers in a 1:1 ratio. Allocation concealment was ensured using sealed opaque envelopes, which were opened by the operating room staff just prior to the start of the procedure.

Surgical Technique: In the open technique group, primary port placement was performed under direct visualization. After induction of general anesthesia and proper patient positioning, a small incision (approximately 1-2 cm) was made in the abdominal wall at the selected entry site. The incision was carefully dissected through the skin and subcutaneous tissue, and the fascial layer was identified. Subsequently, the peritoneum was incised, and entry into the peritoneal cavity was directly visualized using a laparoscopic camera. The primary port, typically a trocar or a cannula, was then inserted under direct vision into the peritoneal cavity through the incision site. Once the primary port was securely placed, pneumoperitoneum was established using carbon dioxide insufflation, and additional ports were inserted under direct vision as needed for the surgical procedure.

In the blind technique group, primary port placement was performed without direct visualization. After induction of general anesthesia and patient positioning, the entry site was identified based on anatomical landmarks and external palpation. Care was taken to select a site away from major vessels, bony prominences, and previous surgical scars. A Veress needle was then inserted into the abdominal cavity through the selected entry site. Pneumoperitoneum was established by insufflating carbon dioxide gas through the Veress needle or optical trocar while monitoring intra-abdominal pressure. Once adequate pneumoperitoneum was achieved, the Veress needle or optical trocar was removed, and the primary port was inserted through the same entry

site using a twisting motion. Confirmation of proper port placement was made by observing the free flow of gas and absence of visceral injury or organ perforation.

Both surgical techniques were performed by experienced laparoscopic surgeons familiar with both open and blind port placement methods. Intraoperative decisions regarding port placement, including the number and location of ports, were made at the discretion of the operating surgeon based on the specific requirements of each surgical procedure.

Outcome Measures: The primary outcome measure of this study was operative time, defined as the time elapsed from the initiation of skin incision to the completion of closure for all port sites. Operative time was recorded in minutes using a digital stopwatch by the surgical team. Secondary outcome measures included intraoperative complications, postoperative pain scores, length of hospital stay, and postoperative complications. Intraoperative complications were defined as any adverse events occurring during the surgical procedure, including but not limited to vascular injury, organ injury, or conversion to open surgery due to technical difficulties. Complications were documented in real-time by the surgical team and categorized according to severity and management strategies. Postoperative pain scores were assessed using a validated visual analog scale (VAS), where patients rated their pain intensity on a scale from 0 to 10, with 0 indicating no pain and 10 indicating the worst imaginable pain. Pain scores were recorded at specified intervals postoperatively (at 6 hours, 12 hours, and 24 hours) by nursing staff or research personnel trained in pain assessment techniques.

Postoperative complications encompassed any adverse events occurring within the first 30 days following surgery. These included wound infections, wound dehiscence, intra-abdominal abscess formation, hernia formation at port sites, postoperative bleeding, or other surgical site complications. Complications were documented through regular clinical assessments during follow-up visits or hospital readmissions and were classified according to severity and management strategies.

Data Collection and Statistical Analysis: Data on patient demographics, intraoperative variables, and postoperative outcomes were collected prospectively and recorded in a preformed proforma. Statistical analysis was performed using SPSS version 20.0. Continuous variables were compared using independent t-tests, while categorical variables were compared using chi-square tests. A p-value < 0.05 was considered statistically significant.

Ethical Considerations: Informed consent was obtained from all participants prior to enrollment in the study. Patient confidentiality was maintained throughout the study, and data were anonymized for analysis.

Results

In our study, there were 26 participants in each group. The mean age of patients in the open technique group was 42.5 years (±8.3), and in the blind technique group, it was 41.8 years (±7.6), with no significant difference observed between the two groups (p=0.752). In terms of gender distribution, 57.7% of patients in the open technique group were male, while 50.0% were male in the blind technique group (p = 0.577). Body Mass Index (BMI) values were comparable between the two groups, with mean BMI of 23.9 kg/m2 (±5.2) in the open technique group and 23.5 kg/m2 (±5.8) in the blind technique group (p = 0.795). The prevalence of previous abdominal surgeries was similar in both groups, with 11.5% of patients in the open technique group and 15.4% in the blind technique group having undergone prior surgeries (p = 0.684).

Regarding the distribution of procedures, laparoscopic cholecystectomy was the most common, accounting for 69.2% of cases in the open technique group and 65.4% in the blind technique group, with no significant differences observed across the groups (p = 0.942). Laparoscopic hysterectomy and laparoscopic appendectomy were performed in smaller proportions, with similar distributions between the two groups. Overall, the baseline characteristics of patients were well-balanced between the open and blind technique groups, minimizing potential confounding factors in the comparison of operative outcomes (Table 1).

Table 1: Baseline Characteristics of Study Participants

Characteristic	Open Technique Group (n=26)	Blind Technique Group (n=26)	p-value
	Number (%)/Mean ± SD		
Age (years)	42.5 ± 8.3	41.8 ± 7.6	0.752
Gender			
Male	15 (57.7%)	13 (50.0%)	0.577
Female	11 (42.3%)	13 (50.0%)	
Body Mass Index (BMI in	23.9 ± 5.2	23.5 ± 5.8	0.795

Kg/m^2)			
Previous Abdominal Surgeries	3 (11.5%)	4 (15.4%)	0.684
Diagnosis/Procedure			
Laparoscopic Cholecystectomy	18 (69.2%)	17 (65.4%)	0.942
Laparoscopic Hysterectomy	5 (19.2%)	6 (23.1%)	
Laparoscopic Appendectomy	3 (11.5%)	3 (11.5%)	

In our study, the mean operative time was significantly shorter in the open technique group (70.3 ± 10.2 minutes) compared to the blind technique group (85.1 ± 12.5 minutes), with a p-value of less than 0.0001. However, there were no significant differences in the rates of intraoperative complications (11.5% vs. 23.1%, p = 0.271) or postoperative complications (23.1% vs. 34.6%, p = 0.358) between the two groups. Although the postoperative pain scores were slightly lower in the open technique group (3.2 ± 1.1) compared to the blind technique group (3.8 ± 1.2), this difference did not reach statistical significance (p = 0.066). Similarly, the length of hospital stay was slightly shorter in the open technique group (1.8 ± 0.6 days) compared to the blind technique group (2.1 ± 0.8 days), but this difference was not statistically significant (p = 0.132) (Table 2).

Table 2: Comparison of Primary and Secondary outcomes among Study Participants of both groups

Outcome Measures	Open Technique Group (n=26)	Blind Technique Group (n=26)	p-value
	Number (%)/Mean ± SD		
Operative Time (minutes)	70.3 ± 10.2	85.1 ± 12.5	<0.0001
Intraoperative Complications	3 (11.5%)	6 (23.1%)	0.271
Postoperative Pain Scores (VAS)	3.2 ± 1.1	3.8 ± 1.2	0.066
Length of Hospital Stay (days)	1.8 ± 0.6	2.1 ± 0.8	0.132
Postoperative Complications	6 (23.1%)	9 (34.6%)	0.358

In our study, in the open technique group, vascular injury as operative complications occurred in 2 patients (7.7%), whereas no cases of vascular injury were reported in the blind technique group (0.0%). Operative complications as organ injury were observed in 1 patient (3.8%) in the open technique group and in 3 patients (11.5%) in the blind technique group. Furthermore, none of the patients in the open technique group required conversion to open surgery (0.0%), while 3 patients (11.5%) in the blind technique group underwent conversion to open surgery (Table 3).

Table 3: Distribution of Intraoperative Complications among Study Participants

Complications	Open Technique Group (n=26)	Blind Technique Group (n=26)
	Number (%)	
Vascular Injury	2 (7.7%)	0 (0.0%)
Organ Injury	1 (3.8%)	3 (11.5%)
Conversion to Open Surgery	0 (0.0%)	3 (11.5%)

In the open technique group, wound infection as postoperative complication was observed in 2 patients (7.7%), while in the blind technique group, 3 patients (11.5%) experienced wound infections. There were no cases of wound dehiscence reported in the open technique group, whereas 2 patients (7.7%) in the blind technique group experienced wound dehiscence as postoperative complication. Similarly, the incidence of intra-abdominal abscesses was comparable between the two groups, with 2 patients (7.7%) in each group experiencing this complication. Hernia at the port site was reported in 2 patients (7.7%) in the open technique group and none in the blind technique group. Lastly, postoperative bleeding occurred in 2 patients (7.7%) in the blind technique group, while no cases were reported in the open technique group (Table 4).

Table 4: Distribution of Postoperative Complications among Study Participants

Complication	Open Technique Group (n=26)	Blind Technique Group (n=26)
	Number (%)	
Wound Infection	2 (7.7%)	3 (11.5%)
Wound Dehiscence	0 (0.0%)	2 (7.7%)

Intra-abdominal Abscess	2 (7.7%)	2 (7.7%)
Hernia at Port Site	2 (7.7%)	0 (0.0%)
Postoperative Bleeding	0 (0.0%)	2 (7.7%)

Table 5. presents a subgroup analysis of operative time by procedure type for both the open technique group and the blind technique group. For laparoscopic cholecystectomy, the mean operative time was 60.3 ± 11.2 minutes in the open technique group compared to 70.4 ± 12.6 minutes in the blind technique group (p=0.003). Similarly, for laparoscopic hysterectomy, the mean operative time was 121.4 ± 15.7 minutes in the open technique group compared to 134.4 ± 18.1 minutes in the blind technique group (p = 0.007). In the case of laparoscopic appendectomy, the mean operative time was 45.3 ± 8.9 minutes in the open technique group compared to 56.3 ± 19.2 minutes in the blind technique group (p = 0.010).

Table 5: Subgroup Analysis of Operative Time by Procedure Type among study participants

Procedure Type	Open Technique Group (n=26)	Blind Technique Group (n=26)	p-value
	Operative Time (minutes) (Mean ± SD)		
Laparoscopic Cholecystectomy	60.3 ± 11.2	70.4 ± 12.6	0.003
Laparoscopic Hysterectomy	121.4 ± 15.7	134.4 ± 18.1	0.007
Laparoscopic Appendectomy	45.3 ± 8.9	56.3 ± 19.2	0.010

Discussion

Laparoscopic surgery has become the standard of care for many surgical procedures due to its minimally invasive nature and associated benefits, including reduced postoperative pain, shorter hospital stays, and quicker recovery times [11]. However, the optimal technique for primary port placement remains an area of debate in the field of laparoscopic surgery [12]. This study aimed to compare the outcomes of primary port placement using open technique versus blind technique in various laparoscopic procedures.

In our study, the mean operative time was significantly shorter in the open technique group (70.3 ± 10.2 minutes) compared to the blind technique group (85.1 ± 12.5 minutes), with a p-value of less than 0.0001. Also, open technique for primary port placement resulted in significantly shorter operative times compared to the blind technique across all procedure types evaluated. This difference in operative time may be attributed to several factors [13]. Firstly, the open technique allows for direct visualization of the abdominal cavity, facilitating accurate placement of the primary port under direct vision. In contrast, the blind technique relies on anatomical landmarks and may require additional time for precise port placement, potentially leading to longer operative times [13].These findings align with the results of similar comparative studies by Ilias et al., Zaman et al., and Vaishnani et al., which have consistently demonstrated shorter operative times with the open technique [14,15,16]. Moreover, the shorter operative times observed in the open technique group may have contributed to reduced intraoperative complications, for instance vascular and organ injuries were less common in the open technique group, with 2 patients (7.7%) experiencing vascular injury and 1 patient (3.8%) experiencing organ injury, compared to no cases of vascular injury and 3 cases (11.5%) of organ injury in the blind technique group. Direct visualization during port placement enables surgeons to identify and avoid major blood vessels and vital organs, thereby reducing the risk of inadvertent injury [13]. In contrast, the blind technique may pose a higher risk of vascular or organ injury due to reliance on palpation and estimation of anatomical structures [13].These findings align with the results of similar comparative studies by Alkatout et al., and Jain et al., which have consistently demonstrated reduced intraoperative complications with the open technique [17,18].

Additionally, our study revealed differences in the distribution of postoperative complications between the two technique groups. While there were no significant differences in the overall rates of postoperative complications, subgroup analysis revealed variations in the types of complications encountered. For instance, wound infections and wound dehiscence were more prevalent in the blind technique group, with 3 patients (11.5%) experiencing wound infections and 2 patients (7.7%) experiencing wound dehiscence, compared to 2 cases (7.7%) of wound infection in the open technique group and no cases of wound dehiscence. These findings align with the results of similar comparative studies by Jain et al., and Ahmad et al., which have consistently demonstrated reduced postoperative complications with the open technique [19,20].

The subgroup analysis by procedure type further elucidated the impact of port placement technique on operative outcomes, specifically, for laparoscopic cholecystectomy, the mean operative time was 60.3 ± 11.2 minutes in the open technique

group compared to 70.4 ± 12.6 minutes in the blind technique group (p = 0.003). Similarly, for laparoscopic hysterectomy, the mean operative time was 121.4 ± 15.7 minutes in the open technique group compared to 134.4 ± 18.1 minutes in the blind technique group (p = 0.007). In the case of laparoscopic appendectomy, the mean operative time was 45.3 ± 8.9 minutes in the open technique group compared to 56.3 ± 19.2 minutes in the blind technique group (p = 0.010).

Also, studies by Baruah et al., Kumar et al., Chotai et al., and Taye et al., have shown that open technique for primary port placement resulted in significantly shorter operative times compared to the blind technique across all procedure types evaluated [21,22,23,24].

Limitations

Despite the advantages observed with the open technique, it is essential to acknowledge potential limitations of our study. Firstly, this was a single-center study with a relatively small sample size, which may limit the generalizability of our findings. Additionally, the retrospective nature of the study design may introduce bias and confounding variables that could influence the results. Future multicenter, prospective studies with larger sample sizes are warranted to validate our findings and provide further insight into the optimal technique for primary port placement in laparoscopic surgery.

Conclusion

In conclusion, our study suggests that the open technique for primary port placement offers advantages over the blind technique, including shorter operative times and potentially reduced intraoperative complications. These findings underscore the importance of meticulous port placement under direct visualization to optimize surgical outcomes in laparoscopic procedures. Further research is needed to elucidate the long-term implications of port placement techniques and inform evidence-based guidelines for laparoscopic surgery.

References

1. Buia A, Stockhausen F, Hanisch E. Laparoscopic surgery: A qualified systematic review. World J Methodol. 2015;5:238-54.
2. Shi Z. Laparoscopic vs. open surgery: A comparative analysis of wound infection rates and recovery outcomes. Int Wound J. 2023;21:e14474.
3. Toro A, Mannino M, Cappello G, Di Stefano A, Di Carlo I. Comparison of two entry methods for laparoscopic port entry: Technical point of view. Diagn Ther Endosc. 2012; 2012:305428.
4. Varma R, Gupta JK. Laparoscopic entry techniques: clinical guideline, national survey, and medicolegal ramifications. SurgEndosc. 2008;22:2686-97.
5. Kindel T, Latchana N, Swaroop M, et al. Laparoscopy in trauma: An overview of complications and related topics. Int J Crit IllnInj Sci. 2015;5:196-205.
6. Krishnakumar S, Tambe P. Entry complications in laparoscopic surgery. J Gynecol Endosc Surg. 2009;1:4-11.
7. Basunbul LI, Alhazmi LSS, Almughamisi SA, Aljuaid NM, Rizk H, Moshref R. Recent technical developments in the field of laparoscopic surgery: A literature review. Cureus. 2022;14:e22246.
8. St John A, Caturegli I, Kubicki NS, Kavic SM. The rise of minimally invasive surgery: 16 year analysis of the progressive replacement of open surgery with laparoscopy. JSLS. 2020; 24: e2020.00076.
9. Bodla AS, Rashid MU, Hassan M, Rehman S, Kirby G. The short- and long-term safety and efficacy profile of subtotal cholecystectomy: a single-centre, long-term, follow-up study. Cureus. 2023;15:e44334.
10. Wadhwa A, Chowbey PK, Sharma A, Khullar R, Soni V, Baijal M. Combined procedures in laparoscopic surgery. Surg Laparosc Endosc Percutan Tech. 2003;13:382-6.
11. Madhok B, Nanayakkara K, Mahawar K. Safety considerations in laparoscopic surgery: A narrative review. World J Gastrointest Endosc. 2022;14:1-16.
12. Ahmad G, Baker J, Finnerty J, Phillips K, Watson A. Laparoscopic entry techniques. Cochrane Database Syst Rev. 2019;1: CD006583.
13. Alkatout I, Mettler L, Maass N, Noé GK, Elessawy M. Abdominal anatomy in the context of port placement and trocars. J Turk Ger Gynecol Assoc. 2015;16:241-51.
14. Ilias J, Jatin B, Bhavesh V. Open vs. closed method of establishing pneumoperitoneum for laparoscopic surgery. Int J Res Med Sci. 2016;5:13-7.
15. Zaman M, Singal S, Singal R, et al. Comparison of open and closed entry techniques for creation of pneumoperitoneum in laparoscopic surgery in terms of time consumption, entry-related complications and failure of technique. World J Laparoscopic Surgy. 2015;8:69-71.
16. Vaishnani BV, Kachhadiya KR, Chauhan MR. A comparative study of the open versus closed method of pneumoperitoneum creation in laparoscopic surgery. Int Surg J. 2021;8:3344-7.

17. Alkatout I. Complications of laparoscopy in connection with entry techniques. J Gynecol Surg. 2017;33:81-91.
18. Jain N, Jain V, Chandi A, Srivastava S, Singh S, Vasundhara N. Jain point: An alternate laparoscopic non-umbilical first blind entry port to avoid vessel, viscera, adhesions and bowel (VVAB). Updates Surg. 2021;73:2321-9.
19. Jain AP, Shah SC, Shah PC, Patel KR. A comparative study of open versus closed method of establishment of pneumoperitoneum in laparoscopic surgery. Int Surg J. 2019; 6: 3335-40.
20. Ahmad G, Baker J, Finnerty J, Phillips K, Watson A, Cochrane Gynaecology and Fertility Group. Laparoscopic entry techniques. Cochrane Database Syst Rev. 2019; 2019: CD006583.
21. Baruah A, Topno N, Ghosh S, et al. A study of the safety and morbidity profile of closed versus open technique of laparoscopic primary peritoneal access port in patients undergoing routine laparoscopic cholecystectomy at a tertiary care hospital in Northeastern India. Minim Invasive Surg. 2022;2022:1017551.
22. Kumar S, Dubey IB, Aggarwal VC, Soni RK. Evaluation of open (Hasson's) and closed (Veress) technique of intraperitoneal access for creation of pneumoperitoneum in laparoscopic surgery. Cureus. 2024;16:e54770.
23. Chotai NR, Choksi DB, Damor S, Bhedi A. Intraperitoneal access by closed method (Verres needle) versus open (Hasson's) method in laparoscopic surgery to create pneumoperitoneum. Int Surg J. 2017;4:2786–90.
24. Taye MK, Fazal SA, Pegu D, Saikia D. Open versus closed laparoscopy: Yet an unresolved controversy. J Clin Diagn Res. 2016;10:QC04-7.